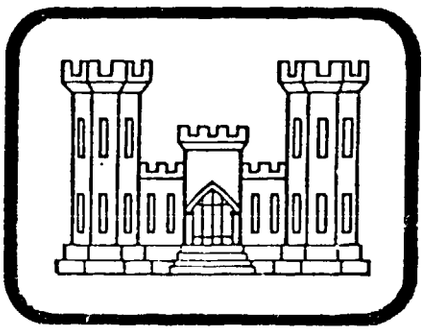
DELAWARE RIVER BASIN

ARLINGTON LAKE DAM
PENNSYLVANIA

NDI ID PA 00321

OWNED BY
STEVEN MOREKIN

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



Prepared for:

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

Prepared by:

O'BRIEN & GERE ENGINEERS, INC.
1617 J F Kennedy Boulevard - Suite 1760
Philadelphia, Pennsylvania 19103

August 1981

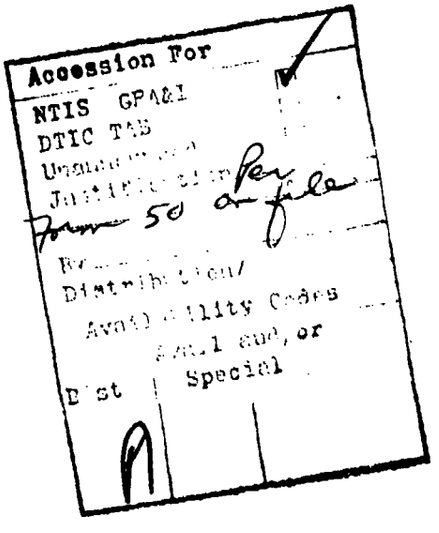
PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected, and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.



PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

Name of Dam:	Arlington Lake Dam
State Located:	Pennsylvania
County Located:	Monroe
Stream:	Big Meadow Run
Coordinates:	N40°59.4', W75°13.7'
Dates of Inspection:	May 5, 1981 & June 1, 1981

ASSESSMENT

Arlington Lake Dam is an earth and concrete structure approximately 240 feet long with a maximum height of about 13 feet. A two stage, ungated overflow spillway system is located at the left abutment of the dam. A drop inlet spillway is located at the approximate midpoint of the embankment. Arlington Lake Dam has a drainage area of approximately 1.7 square miles and impounds a reservoir with a maximum storage capacity of about 51 acre-feet at the low point of the top of the dam. The dam was originally built to provide a lake for ice harvesting. The impoundment is presently used for incidental recreation.

The recommended Spillway Design Flood (SDF) for a "Small" size, "High" hazard dam ranges from one-half of the Probable Maximum Flood (PMF) to the full PMF. The SDF chosen for this "Small" size, "High" hazard dam is one-half of the PMF. The spillways are capable of discharging approximately 8 percent of the PMF prior to overtopping the low point of the top of the dam.

Two houses (permanent residences) are located on the crest of the dam, a restaurant is located about 150 feet downstream of the dam and PA Route 611 is located about 250 feet downstream of the dam.

The vertical concrete wall along the entire upstream face of the dam and the vertical concrete walls along portions of the downstream face of the dam are in very poor condition and appear to be structurally unsafe. It appears that the houses on the crest of the dam would be undermined with a failure of the walls which would coincide with a failure of the dam.

The spillway system is classified as "Seriously Inadequate". The dam is classified as "Unsafe, Non-Emergency".

Based on the visual observations, discussions with the Owner, Mr. Steven Morekin, and information obtained from the Pennsylvania Department of Environmental Resources, Division of Dam Safety, Arlington Lake Dam is considered to be in poor condition.

Recommendations and Remedial Measures

The following recommendations and remedial measures should be initiated immediately.

a. Facilities.

The Owner should retain the services of a licensed professional engineer experienced in the design and construction of dams to assist in complying with these recommendations:

1. The structural integrity of all concrete portions of the dam (including the spillways) should be investigated and those sections determined to be deficient should be replaced.

2. Detailed hydrologic and hydraulic analyses should be performed to evaluate the discharge capacity of the spillway system and remedial measures should be taken to increase the spillway capacity.

3. An investigation should be made as to the source and nature of the seepage noted in Sections 3.1b, 6.1a, and 7.1a.

4. The embankment should be cleared of all trees and brush and any resulting voids should be backfilled with a suitable compacted material. A grass cover should be established and maintained on the bare spots on the embankment resulting from the tree and brush removal.

The Owner should clear the spillway discharge channel of all trees, brush and other obstructions.

b. Operations and Maintenance Procedures.

1. An operation and maintenance program should be developed and implemented. This program should include periodic operation of outlet works, routine maintenance tasks, and an annual inspection performed by a licensed professional engineer, experienced in the design and construction of dams.

2. A monitoring and warning plan should be developed and implemented during periods of extreme rainfall so that affected residents and the appropriate agencies are notified in case of an impending dam failure.

O'BRIEN & GERE ENGINEERS, INC.

John J. Williams, P.E.
Vice President
Pennsylvania Registration No. PE006920E

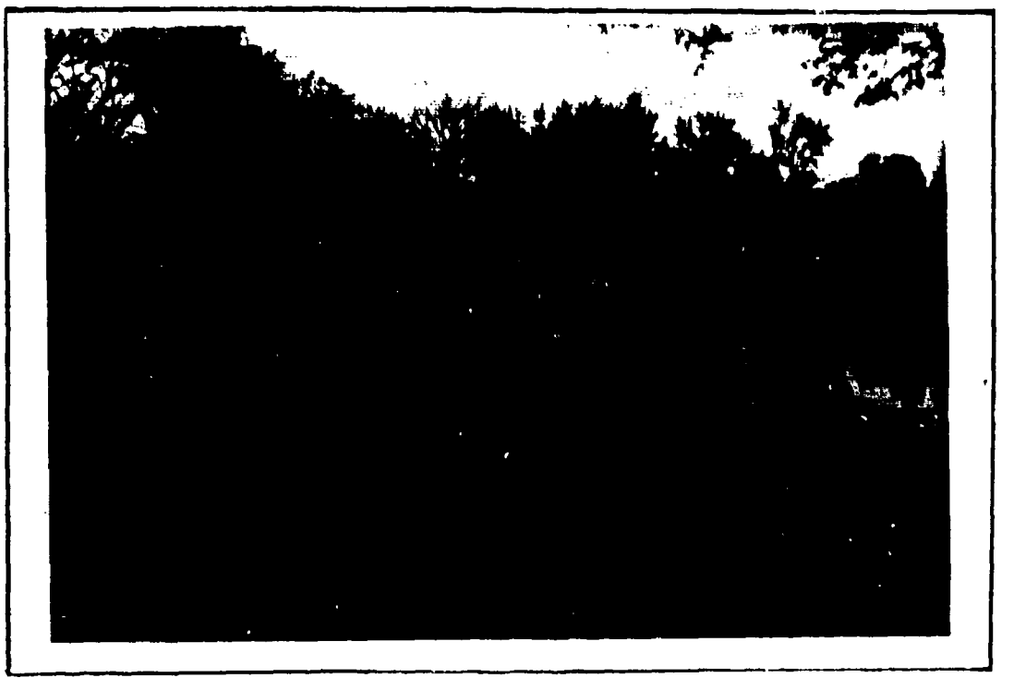
JOHN J. WILLIAMS

Date: 19 Aug. 1981

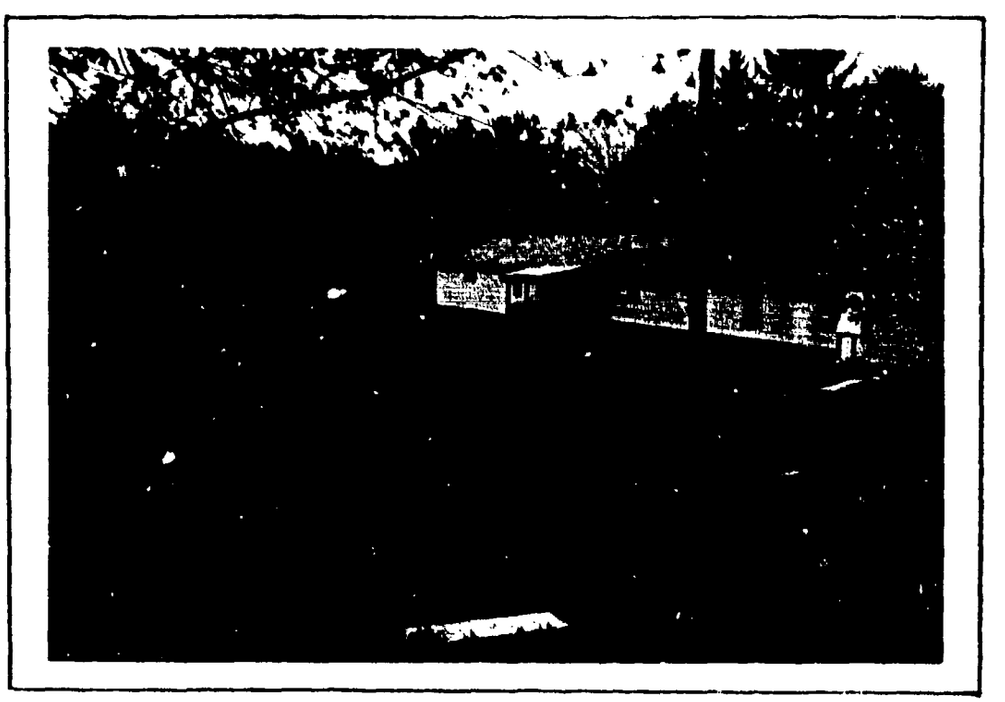
Approved by:

JAMES W. Peck
Colonel, Corps of Egineers
District Engineer

Date: 31 Aug 81



OVERVIEW OF ARLINGTON LAKE DAM FROM THE LEFT ABUTMENT.
(5/5/18)



OVERVIEW OF ARLINGTON LAKE DAM FROM THE RIGHT ABUTMENT.
(5/5/81)

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM
ARLINGTON LAKE DAM
NDI ID #PA00321
PA DER 45-5

SECTION I
PROJECT INFORMATION

1.1 General

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if Arlington Lake Dam constitutes a hazard to human life or property.

1.2 Description of Project (Based on information obtained from the Pennsylvania Department of Environmental Resources (DER), Division of Dam Safety, Harrisburg, Pennsylvania, and from the field inspection).

a. Dam and Appurtenances (Refer to the Site Plan in Appendix E). Arlington Lake Dam is an earth and concrete structure approximately 240 feet long with a maximum height of about 13 feet. A two stage, ungated overflow spillway system is located at the left abutment of the dam. A drop inlet spillway is located at the approximate midpoint of the dam.

The upstream slope of the embankment is retained in a vertical position by a concrete wall which is constructed for the full length of the dam. The downstream slope is essentially level from the right abutment to the location of the drop inlet spillway, a distance of about 120 feet. Two inhabited dwellings are constructed on the crest of the embankment over this portion of the dam. The embankment is terminated and retained by a concrete wall immediately to the right of the drop inlet spillway. The wall is about 6 feet high and extends downstream for about 50 feet. A portion of the downstream slope to the left of the drop inlet spillway is retained by a concrete wall about 8 feet high and 30 feet long which forms a right angle with the retaining wall that extends downstream from near the drop inlet spillway. The crest width of the embankment in this location is about 8 feet.

The two stage, ungated overflow spillway system consists of a principal spillway with an 8-foot weir length and a 30-foot long wasteway with a concrete apron constructed to direct the wasteway discharge into the principal spillway discharge channel. The discharge channel is bounded on the right side by a concrete retaining wall about 5 feet high and extending downstream for about 50 feet.

The drop inlet spillway is a 3.5-foot wide by 4.5-foot long concrete structure about 6 feet deep with a 3 foot long weir on the upstream face of the dam. A 12-inch diameter concrete pipe in the upstream wall of the structure serves as a

reservoir drain. Flow through the drain is controlled by a timber plank on the upstream face of the dam. The outlet for the drop inlet is a 36-inch diameter concrete conduit which begins at the downstream wall of the drop inlet spillway structure. This conduit extends through the embankment with its outlet flush with the downstream retaining wall. The outlet invert is about one foot above the surface of the outlet channel. The outlet channel is bounded on the right side by the 8 feet high concrete retaining wall extending downstream from the dam.

b. Location. Arlington Lake Dam is located on Big Meadow Run about one mile west of Stroudsburg, Stroud Township, Monroe County, Pennsylvania. The site is shown on the USGS Quadrangle sheet entitled "Stroudsburg, P.A.-N.J." at coordinates N40°59.4', W75°13.7'. A regional vicinity map for Arlington Lake Dam is included as Figure 1, Appendix E.

c. Size Classification. The maximum height of the dam is about 13 feet and the reservoir storage at the low point of the top of the dam is 51 acre-feet. The dam is therefore classified as a "Small" size structure (height less than 40 feet and storage less than 1,000 acre-feet).

d. Hazard Classification. Two inhabited houses are located on the crest of the dam. A restaurant is located about 150 feet downstream of the dam and PA Route 611 is located about 250 feet downstream of the dam. The dam is therefore classified as a "High" hazard structure because of the potential for the loss of more than a few lives and excessive property damage in the event of a dam failure.

e. Ownership. The dam is owned by Mr. Steven Morekin. The Owner's home is adjacent to the right dam abutment. He may be contacted by telephone at (717) 421-7020.

f. Purpose of Dam. Arlington Lake Dam was originally constructed to provide an impoundment for ice harvesting. The impoundment is currently used for incidental recreation.

g. Design and Construction History. The dam was originally a wooden structure constructed during the late 1800's to provide an impoundment for ice harvesting. In 1910, Elmer Albert bought the site and erected a concrete dam. The dam failed twice within the following two years and in 1913, Mr. Albert began repair work on the structure. In 1914, after the repair work had begun, Mr. Albert was required by the Pennsylvania Water Supply Commission to increase the spillway capacity by raising the crest of the dam, to construct an earthfill against the downstream face of the dam to stabilize the structure and to repair structural cracking of the concrete. The repair work was not completed until 1916. Photographs and inspection reports obtained from the Pennsylvania DER indicate that the requirements of the Water Supply Commission apparently were never adequately met and the dam has been in poor condition since its original construction.

Correspondence dated 1949 stated that the reservoir had completely drained through cracks in the dam on three separate occasions since 1937.

The crest of the drop inlet spillway weir was raised an estimated one foot in 1980. This was accomplished by placing concrete on the existing weir crest.

No design data or calculations are available for this site.

h. Normal Operating Procedures. According to the Owner, operating procedures for the dam would consist of drawing down the reservoir by removing the timber plank placed over the inlet of the 12-inch diameter conduit in the drop inlet spillway.

1.3 Pertinent Data

a. Drainage Area (Square Miles). 1.7

b. Discharge at Dam Site (cfs).

Maximum known flood discharge	Unknown
Complete Spillway System Capacity, El. 477.8 Low Point Top of Dam	246
Principal Spillway Capacity, El. 477.8, Low Point Top of Dam	125
Wasteway Capacity, El. 477.8, Low Point Top of Dam	104
Drop Inlet Spillway Capacity, El. 477.8, Low Point Top of Dam	17

c. Elevations (Feet above MSL estimated from USGS).

Top of Dam (Low Point)	477.8
Wasteway Crest	476.7
Drop Inlet Weir Crest	476.3
Principal Spillway Crest (Normal Pool)	474.8
Invert of 12-inch drain pipe at inlet	471.9
Invert of 36-inch drain pipe at outlet	466.1
Streambed at Downstream Toe of the Dam	465.0

d. Reservoir Length (Feet).

Normal Pool, Elev. 474.8	1,850
Maximum Pool, Elev. 477.8	2,000

e. Reservoir Surface (Acres).

Normal Pool, Elev. 474.8	4.5
Maximum Pool, Elev. 477.8	28.3

f. Reservoir Storage (Acre-Feet).

Normal Pool, Elev. 474.8	14
Maximum Pool, Elev. 477.8	51

g. Dam Data.

Type	Earth with concrete retaining wall on upstream face
Length	240 Feet
Height	13 Feet
Top Width	Varies from 8 Feet to about 50 Feet
Side Slopes: Upstream	Vertical
Downstream	Varies from nearly vertical to nearly horizontal
Zoning	Unknown
Impervious Core	Unknown
Foundation Treatment	Unknown

h. Diversion System.

None

i. Spillway Data.

Type	Ungated Overflow
Length: Principal Spillway	8 Feet
Wasteway	30 Feet
Width: Principal Spillway	1 Foot
Wasteway	1 Foot
Discharge Channel	Concrete for about 25 feet then modified earth channel for 1,000 feet to confluence with Pocono Creek.

j. Outlet Works.

The outlet works consist of a 3.5-foot wide by 4.5-foot long drop inlet with a 3-foot long weir on the upstream wall. Discharge in a 12-inch diameter concrete pipe which has an invert 4.4 feet below the weir crest is controlled by means of a timber plank on the upstream face of the dam. The outlet works from the drop inlet consists of a 36-inch diameter concrete pipe.

SECTION 2

ENGINEERING DATA

2.1 Design

a. Data Available. No design data are available for the dam.

b. Design Features. The design features are described in Section 1.2a and are shown on the sheets in Appendix E.

2.2 Construction

The construction history of the dam is discussed in Section 1.2g.

2.3 Operation

According to the Owner, the operational procedures for the dam would consist of removing the timber plank placed over the inlet of the 12-inch diameter reservoir drain pipe. No operational data are available.

2.4 Evaluation

a. Availability. The limited engineering data utilized in this report were provided by the Pennsylvania DER.

b. Adequacy. The information provided by the Pennsylvania DER, visual observations and discussions with Mr. Steven Morekin, the Owner, are considered to be adequate for a Phase I investigation.

c. Validity. There appears to be no reason to question the validity of the information obtained from the Pennsylvania DER and Mr. Morekin.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The field inspections of Arlington Lake Dam took place on May 5, 1981 and June 1, 1981. At the times of the inspections, the water surface was approximately 0.2 feet above the principal spillway crest. The observations and comments of the field inspection team are in the checklist which is Appendix A of this report. No underwater elements of the dam were inspected. The dam and its appurtenances appear to be in poor condition.

b. Dam. Several trees with trunks up to 8 inches in diameter were observed growing on the downstream embankment on the right side of the retaining wall adjacent to the spillway discharge channel. The concrete retaining wall on the upstream face of the dam was found to be severely eroded and cracked (up to 2-inch wide cracks) at the water level along most of the length of the dam. Water passages were observed on the face of the dam at points where large pieces of concrete had been eroded away. The retaining wall on the downstream face of the embankment contains large diagonal structural cracks (up to 2 inches wide). Seepage (about 20 gpm) was observed flowing from a crack in the right side wall of the drop inlet spillway at the invert of the structure. Seepage (about 30 gpm) was noted discharging from the downstream retaining wall near the outlet of the 36-inch diameter reservoir drain pipe. Standing seepage water was observed about 30 feet downstream from the retaining wall to the left of the drop inlet spillway. The soil in this area was noted to be very soft and swampy.

c. Appurtenant Structures. The concrete of the principal spillway and wasteway is severely cracked and eroded. The remains of a concrete buttress partially obstructs the principal spillway. Trees with trunks up to 8 inches in diameter were noted growing through the concrete on the left side of the wasteway. Trees with trunks up to 6 inches in diameter and brush were also observed growing in the spillway discharge channel. The retaining wall on the right side of the spillway discharge channel contains large structural cracks (up to 2 inches).

The drop inlet spillway appeared to be in fair condition. The side walls contained cracks through which seepage discharge was observed, as noted above. A 4-inch diameter pipe parallel to the centerline of the dam apparently supports the side walls of the structure. A small amount of seepage was observed flowing through the 12-inch diameter reservoir drain outlet pipe in the upstream wall of the drop inlet.

d. Reservoir. Evidence of sedimentation was observed during the field inspection of the reservoir. The perimeter of the reservoir is wooded and the slopes average between 5 and 15 percent. Concrete retaining walls were observed on the east and west slopes of the impoundment. Both walls are constructed at right angles to the dam. The east retaining wall is severely eroded and contains trees (up to 8-inch diameter trunks) that have grown up through the concrete. The retaining wall on the west side of the impoundment was observed to be in fair condition.

e. Downstream Channel. The downstream channel for the first few hundred feet downstream from the dam is obstructed with trees, brush and debris. The channel is relatively free of obstructions south of the Pennsylvania Route 611 culvert. The average channel grade is approximately 1 percent.

The initial hazard area at this site is on the dam itself. Two houses (year-round residences) are located on the crest of the dam. A restaurant is located about 150 feet downstream of the dam and PA Route 611 is located about 250 feet downstream of the dam.

3.2 Evaluation. The concrete on the upstream face of the dam is so severely eroded and spalled that extensive water passages through the dam have developed. The seepage at the downstream toe of the embankment may indicate that piping is occuring through the embankment and/or the foundation of the dam. The trees growing on the dam create potential seepage paths through the embankment and may endanger the integrity of the structure. The capacity of the spillway discharge channel is limited by the trees and brush growing in it. The general condition of the dam is poor.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures

According to the Owner, the operational procedure for this dam consists of the removal of the timber plank from the inlet end of the 12-inch diameter reservoir drain pipe on the upstream face of the dam.

4.2 Maintenance of the Dam

According to the Owner, no written maintenance procedures exist for Arlington Lake Dam and repairs are made as needed.

4.3 Maintenance of Operating Facilities

Maintenance of the operating facilities at the dam would consist of keeping the spillways free from obstructions. According to the Owner, maintenance is performed as needed.

4.4 Description of Any Warning Systems in Effect

According to the Owner, no written warning procedures exist for the dam. The dam is monitored during large storms by Mr. Morekin. In the event of an impending dam failure, Mr. Morekin would notify the local Civil Defense.

4.5 Evaluation

The overall appearance of the dam indicates that it is marginally maintained. A regular inspection and maintenance program should be established which would include repair of all concrete structures, removing all trees from the embankment and clearing the spillway discharge channel of all obstructions.

A system of warning downstream residents in the event of an impending dam failure should be developed.

SECTION 5

HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Arlington Lake Dam has a drainage area of approximately 1.7 square miles and impounds a reservoir with a maximum storage capacity of about 51 acre-feet. The drainage basin has a maximum width of about 1.4 miles and a maximum length of about 2.1 miles. The ground surface ranges from Elev. 860 in the upper reaches of the watershed to Elev. 474.8 at normal pool. The drainage area is generally moderately to steeply sloping woodland and open fields. The southwest portion of the basin is developed both residentially and commercially.

The spillway system consists of an 8-foot long ungated principal overflow section (Crest Elev. 474.8) and a 30 feet long wasteway (Crest Elev. 476.7) with a concrete apron on the downstream side. A 3-foot long weir (Crest Elev. 476.3) is located on the upstream face of the dam. Discharge through the weir flows into a drop inlet and then through a 36-inch diameter concrete pipe located at the base of the downstream wall of the inlet structure. A 12-inch diameter concrete reservoir drain pipe is located in the upstream wall of the inlet. Discharge through the reservoir drain is controlled by means of a timber plank over the inlet to the drain on the upstream face of the dam.

b. Experience Data. According to the Owner, no rainfall or reservoir level records are kept for this dam.

c. Visual Observations. The remains of a concrete buttress partially obstructs the principal spillway. Discharge is impeded by trees, brush and debris in the spillway discharge channel.

d. Overtopping Potential. The overtopping potential of this dam was estimated using the HEC-1, Dam Safety Version, computer program. A brief description of the program is included in Appendix D, Sheet 2.

The recommended Spillway Design Flood (SDF) for a "Small" size, "High" hazard dam ranges from one-half of the Probable Maximum Flood (PMF) to the full PMF. The selected SDF for Arlington Lake Dam is one-half of the PMF, because the dam has a small storage capacity.

The SDF was routed through the dam using the HEC-1 computer program. The peak inflow and outflow rates for the SDF were computed to be about 2,000 cfs and 1,870 cfs, respectively. Based on the hydrologic and hydraulic analysis, the spillway is capable of discharging about 8 percent of the PMF before overtopping of the low point of the dam crest occurs. The SDF would overtop the dam by a maximum depth of about 2.5 feet and the duration of overtopping would be about 11.5 hours.

e. Spillway Adequacy. The vertical concrete wall along the entire upstream face of the dam and the vertical concrete walls along portions of the downstream face of the dam are in very poor condition and appear to be structurally unsafe. It appears that the houses on the crest of the dam would be undermined with a failure of the walls which would coincide with a failure of the dam. The dam would probably fail during an event of far less severity than the SDF. A failure of the dam would increase the hazard to loss of life. The spillway is classified as "Seriously Inadequate". The dam is considered to be "Unsafe, Non-Emergency".

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. Several trees with trunks up to 8 inches in diameter were observed growing on the downstream embankment slope and at the left abutment of the dam. The upstream concrete face of the dam was found to be severely eroded and spalled and contained many water passages. The retaining wall on the dowstream face of the dam contains large, diagonal, structural cracks. The concrete principal spillway and wasteway were observed to be severely damaged. Seepage (20 gpm) was noted flowing from a large crack in the concrete at the invert of the drop inlet spillway. About 30 gpm of seepage water was observed discharging from around the outlet to the 36-inch diameter reservoir outlet conduit at the base of the retaining wall on the downstream side of the dam. Moist, swampy ground and standing seepage water was observed at the downstream toe of the embankment to the left of the drop inlet spillway.

Based on visual observations, Arlington Lake Dam appears to be in poor structural condition. A failure of the dam as a result of a collapse of the walls may occur. A failure of the dam by piping of the embankment could also result if the seepage problem is left unchecked. An investigation should be made as to the source and nature of the seepage and appropriate actions should follow.

The stability of the structure is questionable because of the very poor condition of all of the concrete and the seepage problems discussed above.

b. Design and Construction Data. No design or construction data are available for this dam.

c. Operating Records. According to the Owner, no operating records are maintained for this dam.

d. Post Construction Changes. The post construction changes made to the original concrete dam are discussed in Section 1.2g. A design drawing detailing the repair work done by Mr. Elmer Albert in 1914 and a post construction drawing of the dam are included in Appendix E.

e. Seismic Stability. Arlington Lake Dam is located in Seismic Zone 1 of the Seismic Zone Map of Contiguous States. A dam located in Seismic Zone 1 is generally considered to be safe under any expected Zone 1 earthquake loading conditions if it is stable under static loading conditions. Since the dam does not appear to be structurally stable for potential static loadings, it is doubtful that it would be stable for seismic loadings.

SECTION 7

ASSESSMENT, RECOMMENDTIONS AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Evaluation. Based on the visual observations and review of the available information, Arlington Lake Dam appears to be in poor condition. Several deficiencies were noted during the inspection.

Large trees were found growing on the downstream embankment, at the left abutment and in the spillway discharge channel. The upstream concrete face of the dam was found to be severely eroded, spalled and contained many water passages. The retaining wall on the downstream face of the dam contains large diagonal structural cracks. The concrete principal spillway and wasteway were observed to be severely damaged. The remains of a concrete buttress were found obstructing the principal spillway weir. Seepage (about 20 gpm) was noted flowing from a large crack in the concrete at the invert of the drop inlet spillway. About 30 gpm of seepage water was observed discharging from around the outlet to the 36-inch diameter reservoir drain outlet conduit at the base of the retaining wall on the downstream face of the dam. Soft, moist ground and standing seepage water was observed at the downstream toe of the embankment to the left of the drop inlet.

Arlington Lake Dam is a "Small" size, "High" hazard structure. The SDF selected is one-half of the PMF. The spillway is capable of discharging about 8 percent of the PMF before the embankment is overtopped. Two houses (permanent residences) are located on the crest of the dam. The spillway is classified as "Seriously Inadequate". The dam is classified as "Unsafe, Non-Emergency".

b. Adequacy of Information. The information obtained from the Pennsylvania DER, visual observations and discussions with Mr. Morekin, the Owner, is considered adequate for a Phase I investigation.

c. Urgency. The remedial measures recommended in Section 7.2 should be initiated immediately.

d. Necessity for Further Information. Further investigation should be implemented as discussed in Section 7.2.

7.2 Recommendations and Remedial Measures

The following recommendations and remedial measures should be initiated immediately.

a. Facilities.

The Owner should retain the services of a licensed professional engineer experienced in the design and construction of dams to assist in complying with these recommendations:

1. The structural integrity of all concrete portions of the dam (including the spillways) should be investigated and those sections determined to be deficient should be replaced.

2. Detailed hydrologic and hydraulic analyses should be performed to evaluate the discharge capacity of the spillway system and remedial measures should be taken to increase the spillway capacity.

3. An investigation should be made as to the source and nature of the seepage noted in Sections 3.1b, 6.1a, and 7.1a.

4. The embankment should be cleared of all trees and brush and any resulting voids should be backfilled with a suitable compacted material. A grass cover should be established and maintained on the bare spots on the embankment resulting from the tree and brush removal.

The Owner should clear the spillway discharge channel of all trees, brush and other obstructions.

b. Operations and Maintenance Procedures.

1. An operation and maintenance program should be developed and implemented. This program should include periodic operation of outlet works, routine maintenance tasks, and an annual inspection performed by a licensed professional engineer, experienced in the design and construction of dams.

2. A monitoring and warning plan should be developed and implemented during periods of extreme rainfall so that effected residents and the appropriate agencies are notified in case of an impending dam failure.

APPENDIX A

INSPECTION CHECKLIST

CHECK LIST
VISUAL INSPECTION
PHASE I

Name Dam Arlington Lake County Monroe State Pennsylvania National ID # PA 00321

Type of Dam Earth-Concrete Hazard Category High

Date(s) Inspection 5/5/81 & 6/1/81 Weather Partly Cloudy (5/5/81) Temperature 75° (5/5/81)

Pool Elevation at Time of Inspection 475 M.S.L. Tailwater at Time of Inspection ± 462 M.S.L.

Inspection Personnel:

R. Horvath
L. Beck
J. Rauschkolb
L. DeHeer (6/1/81)

R. Horvath Recorder

Remarks:

Mr. Steven Morekin, the owner, met us at the dam site. (5/5/81)

Sheet 1 of 11

CONCRETE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	About 20 gpm seeping from a large crack at the invert of the drop inlet on right side.	All concrete in the dam must be replaced or repaired.
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	8-inch diameter trees have grown up through the concrete of the left abutment and the retaining wall on the left side of the dam.	Trees must be removed & resulting voids must be back-filled with suitable compacted material.
DRAINS	None known of.	
WATER PASSAGES	Extensive water passages through the deteriorated concrete on upstream face of the dam at the water line.	Refer to recommendation at the top of this sheet.
FOUNDATION	Unknown.	

Sheet 2 of 11

CONCRETE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Extensive surface cracking of the concrete of the entire dam.	Refer to the recommendation at the top of sheet 2.
STRUCTURAL CRACKING	Retaining wall of downstream face of the embankment contains large diagonal cracks about 2 inches wide.	Refer to the recommendation at the top of sheet 2.
VERTICAL AND HORIZONTAL ALIGNMENT	Satisfactory	
MONOLITH JOINTS	None observed.	
CONSTRUCTION JOINTS	None observed.	

Sheet 3 of 11

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Appears to be satisfactory.	
RIPRAP FAILURES	No riprap was observed.	

Sheet 4 of 11

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
DRAINS	None observed.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Appears satisfactory.	
ANY NOTICEABLE SEEPAGE	Extensive seepage observed at the downstream toe of the left side of the dam. Entire area at toe is soft and wet and contains some standing water. About 30 gpm was observed discharging from the downstream retaining wall around the reservoir outlet conduit.	The source and nature of the seepage should be investigated.
STAFF GAGE AND RECORDER	None observed.	

Sheet 5 of 11

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed.	
INTAKE STRUCTURE	A 12-inch diameter concrete pipe is sealed off with a timber plank at the upstream face of the dam. This pipe discharges onto the invert of the concrete drop spillway 3.5' wide (upstream) by 4.5' long.	
OUTLET STRUCTURE	A 36-inch diameter concrete outlet conduit conducts water from the invert of the drop inlet through the downstream concrete retaining wall of the dam.	
OUTLET CHANNEL	The outlet channel is the natural stream channel which meets the spillway discharge channel about 100' downstream of the dam.	
EMERGENCY GATE	The emergency gate is a timber plank which is placed over the upstream end of the 12-inch diameter intake pipe.	

Sheet 6 of 11

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The concrete weir is in very poor condition. It consists of a 30-foot long wasteway and a 8-foot long principal spillway. The remains of an 18-inch thick concrete buttress stands at the center of the principal spillway.	All of the concrete should be either replaced or repaired.
APPROACH CHANNEL	The impoundment is the approach channel.	
DISCHARGE CHANNEL	The discharge channel downstream of the principal spillway is concrete for about 25 feet. Discharge from the wasteway flows onto a concrete apron. The apron is in very poor condition. The outlet works channel joins the principal spillway discharging channel about 100' downstream from the dam.	All of the concrete should be either replaced or repaired.
BRIDGE AND PIERS	None.	

Sheet 7 of 11

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE AND PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

Sheet 8 of 11

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed.	
OBSERVATION WELLS	None observed.	
WEIRS	None observed.	
PIEZOMETERS	None observed.	
OTHER		

Sheet 9 of 11

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The slopes along the perimeter of the lake vary from about 5 to 15 percent. Most of the shore line is covered with trees, brush or grass.	
SEDIMENTATION	An appreciable amount of the reservoir storage is filled with sediment.	Dredging of the impoundment should be considered.

Sheet 10 of 11

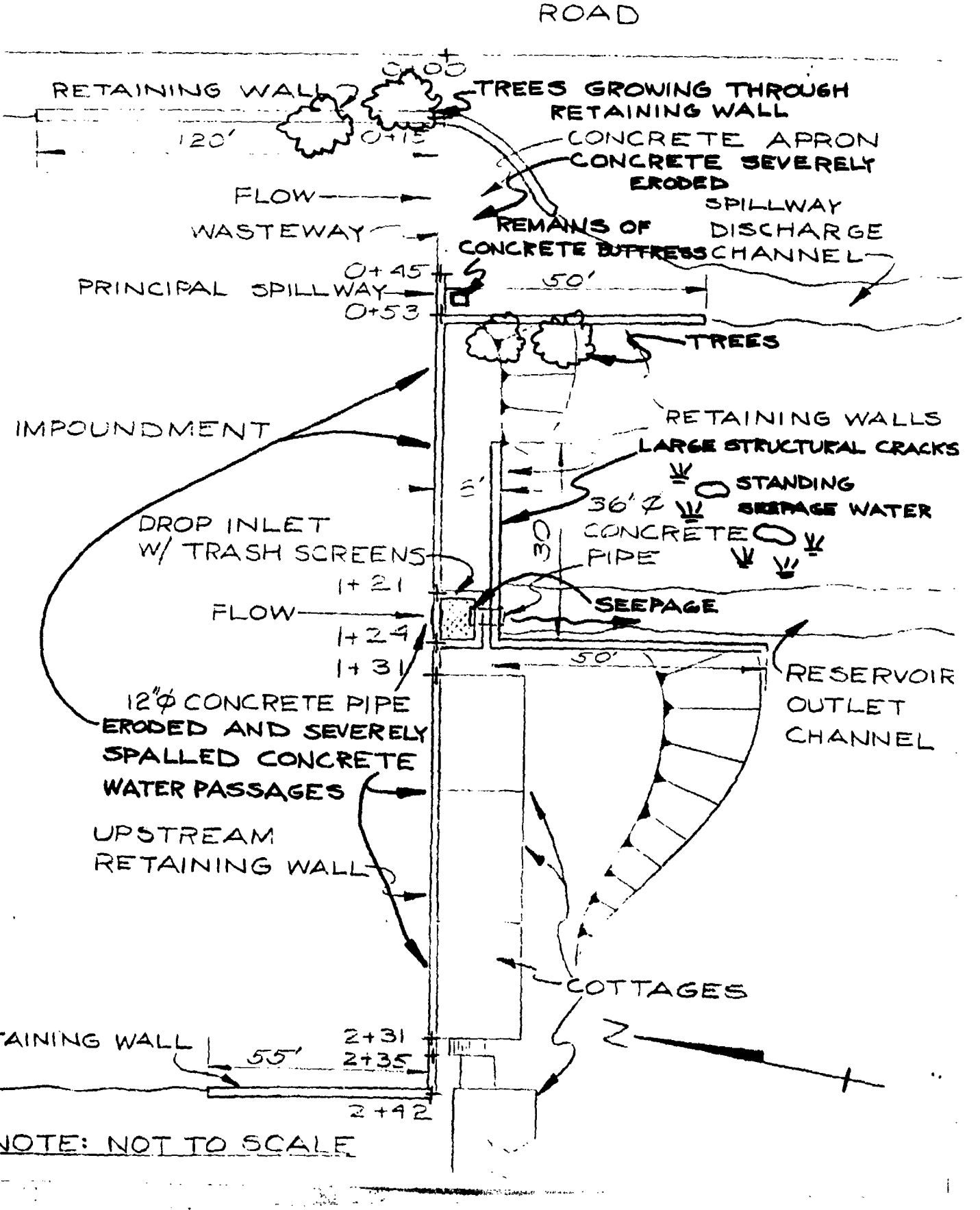
DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Discharge is directed to a bridge culvert under PA Rt. 611 about 300 feet downstream of the dam. The channel is obstructed with trees, brush and debris.	
SLOPES	The channel side slopes are ill defined averaging about 4H:IV. The channel invert slope varies between one and two percent.	
APPROXIMATE NO. OF HOMES AND POPULATION	Two houses are located on the crest of the dam. Both are occupied.	The dam is in the "High" hazard potential category.

Sheet 11 of 11

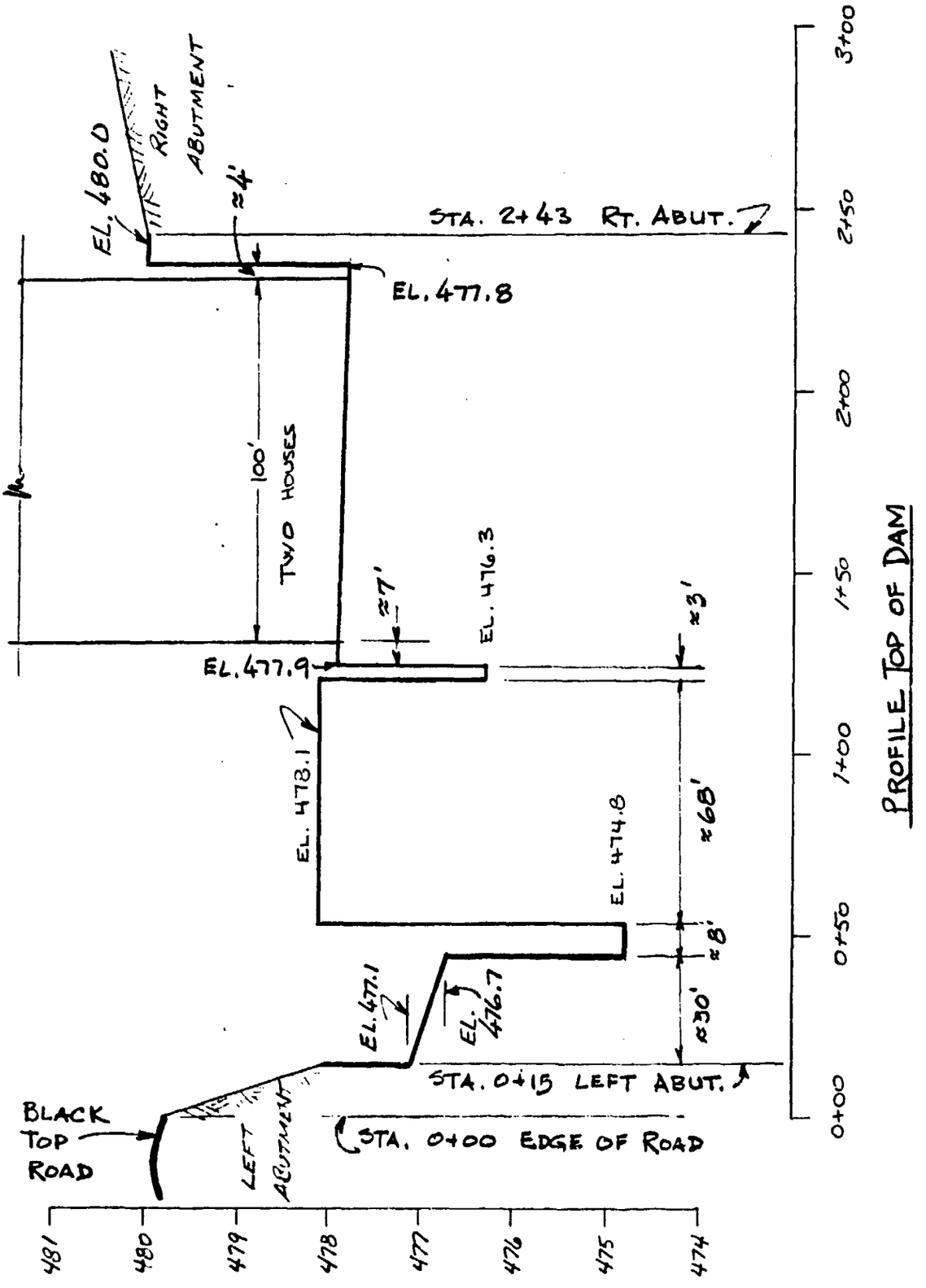
O'BRIEN & GERE
ENGINEERS, INC

ARLINGTON LAKE DAM	IIA	RAB	6/29/81	1E41.014.111



O'BRIEN & GERE ENGINEERS, INC.

SUBJECT	SHEET	BY	DATE	JOB NO
ARLINGTON LAKE DAM	11B	JFR	6-22-81	1841-014-111



APPENDIX B

CHECKLIST
ENGINEERING DATA

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Arlington Lake Dam

ID # PA --321

ITEM	REMARKS
AS-BUILT DRAWINGS	Refer to Appendix E
REGIONAL VICINITY MAP	Refer to Appendix E
CONSTRUCTION HISTORY	Refer to Section 1.2 g
TYPICAL SECTIONS OF DAM	Refer to Appendix E
OUTLETS - PLAN	Refer to Appendix E
DETAILS	
CONSTRAINTS	None Available
DISCHARGE RATINGS	None Available.
RAINFALL/RESERVOIR RECORDS	

Sheet 1 of 4

ITEM	REMARKS
DESIGN REPORTS	None Available
GEOLOGY REPORTS	None provided. Refer to Appendix F.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None Available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None Available.
POST-CONSTRUCTION SURVEYS OF DAM	None
BORROW SOURCES	Unknown

Sheet 2 of 4

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	Refer to Section 1.2 g
HIGH POOL RECORDS	None Available.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None Available.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Dam failed once in 1911 and again in 1912. Both failures drained the reservoir.
MAINTENANCE OPERATION RECORDS	None available.

Sheet 3 of 4

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	Refer to Appendix E.
OPERATING EQUIPMENT PLANS & DETAILS	None.
MISCELLANEOUS	

Sheet 4 of 4

APPENDIX C

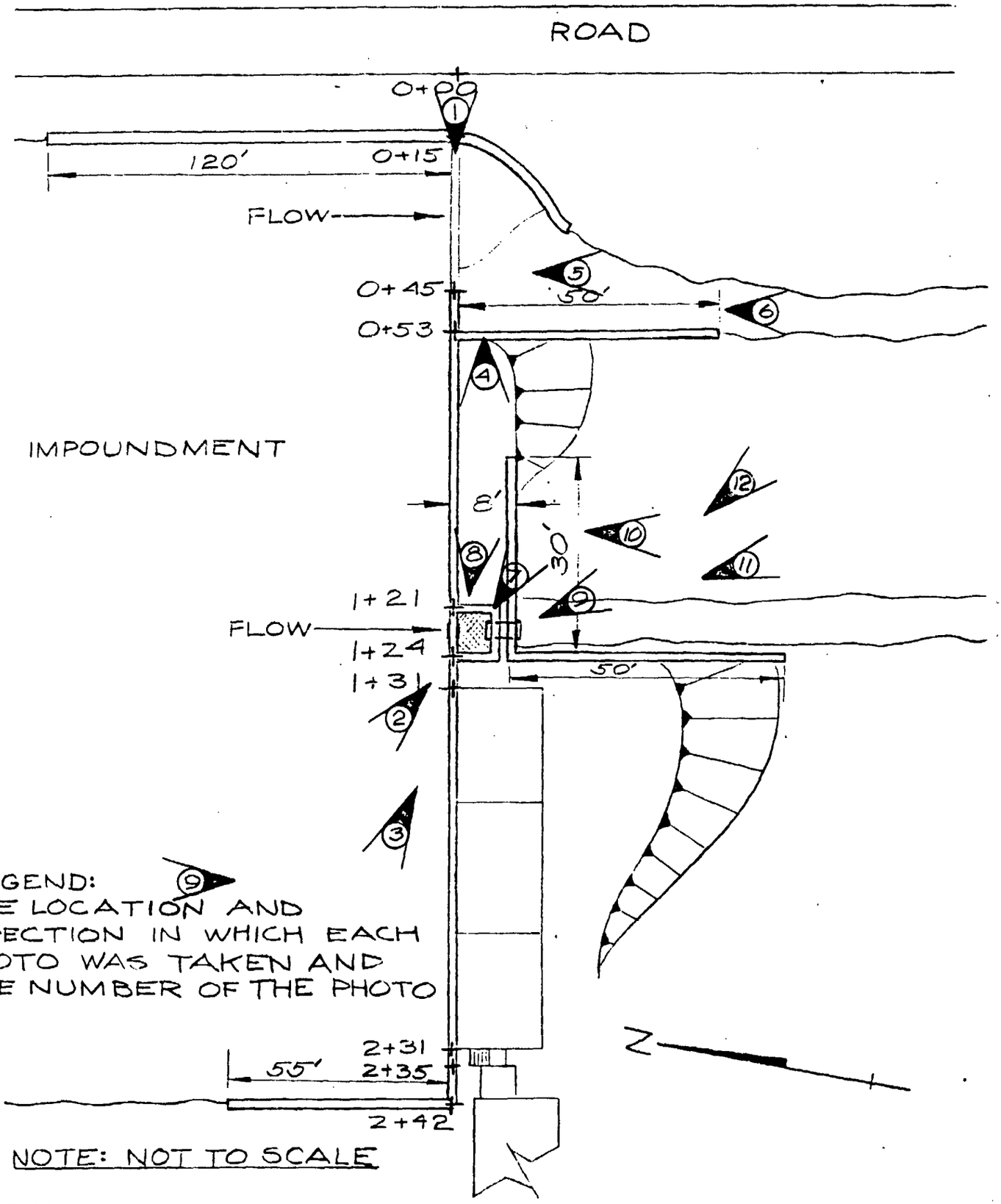
PHOTOGRAPHS

APPENDIX C

SELECTED PHOTOGRAPHS OF THE PROJECT

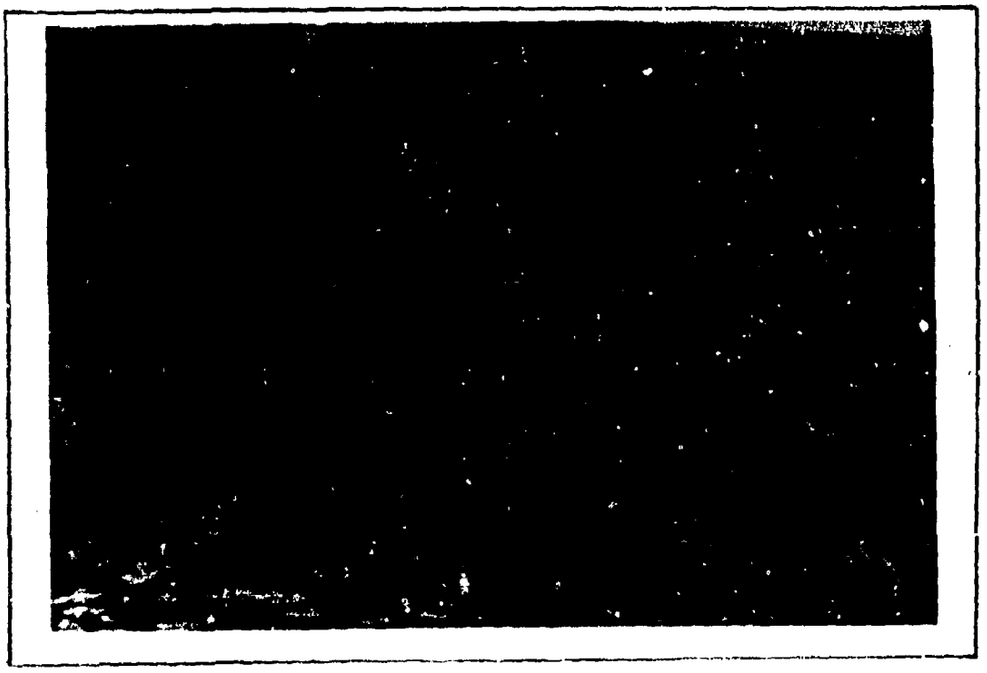
O'BRIEN & GERE
ENGINEERS, INC

SUBJECT	SHEET	BY	DATE	JOB NO.
ARLINGTON LAKE DAM	A	RAB	6/24/81	1841.014.111

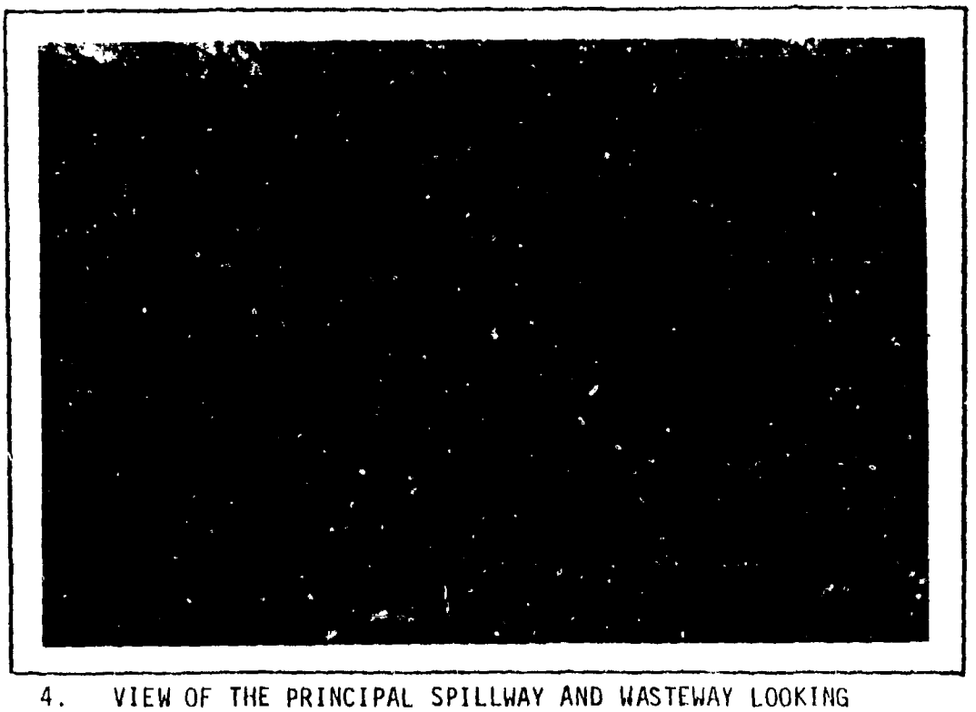


1. VIEW ALONG THE TOP OF THE DAM FROM THE LEFT ABUTMENT. (5/5/81)

2. VIEW OF THE UPSTREAM FACE OF THE DAM SHOWING THE DROP INLET WEIR AND THE CONDITION OF THE RETAINING WALL. (5/5/81)



3. CLOSE-UP OF ERODED CONCRETE ON THE UPSTREAM FACE OF THE DAM. (5/5/81)



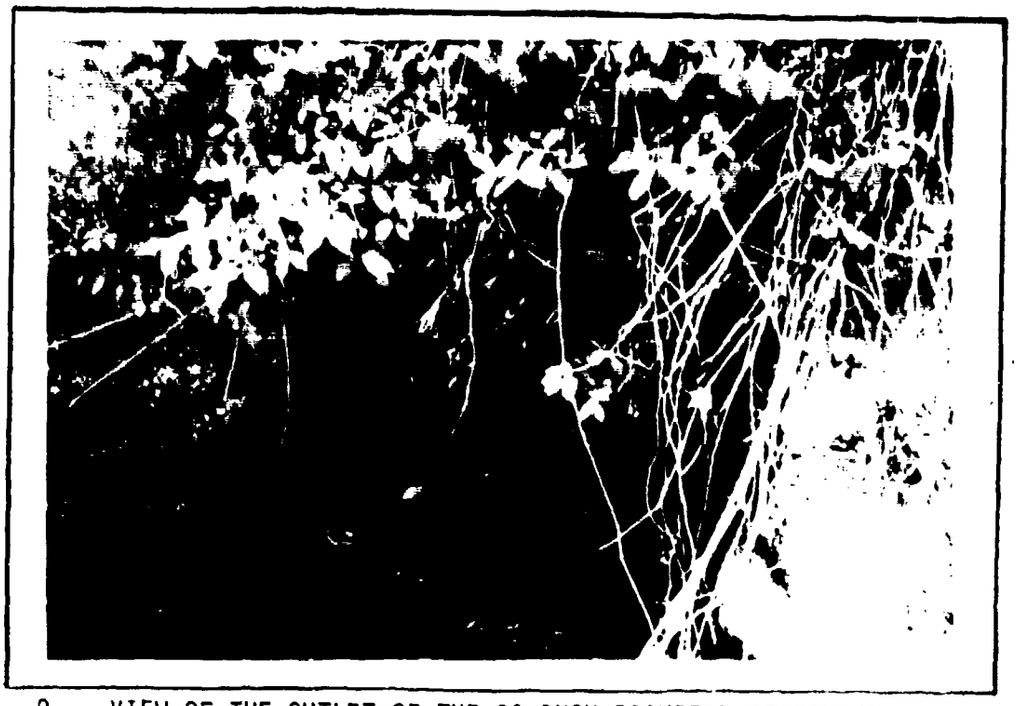
4. VIEW OF THE PRINCIPAL SPILLWAY AND WASTEWAY LOOKING TOWARD THE LEFT ABUTMENT OF THE DAM. (5/5/81)

5. VIEW OF THE PRINCIPAL SPILLWAY AND THE REMAINS OF THE BUTTRESS, LOOKING UPSTREAM. (5/5/81)

6. VIEW LOOKING UPSTREAM AT THE SPILLWAY DISCHARGE CHANNEL. (5/5/81)

7. VIEW OF THE DROP INLET SPILLWAY WEIR AND TRASH SCREENS. (5/5/81)

8. VIEW OF THE INVERT OF THE DROP INLET SHOWING SEEPAGE AND THE INLET OF THE 36-INCH DIAMETER RESERVOIR OUTLET CONDUIT. (5/5/81)



9. VIEW OF THE OUTLET OF THE 36-INCH DIAMETER RESERVOIR OUTLET CONDUIT SHOWING SEEPAGE. (5/5/81)

10. VIEW OF THE DOWNSTREAM RETAINING WALL, THROUGH WHICH THE OUTLET CONDUIT EMERGES, SHOWING LARGE STRUCTURAL CRACKS. (5/5/81)

11. VIEW OF THE STREAM FORMED BY SEEPAGE AT THE RESERVOIR OUTLET CONDUIT. (5/5/81)

12. VIEW OF STANDING SEEPAGE WATER AT THE DOWNSTREAM TOE OF THE EMBANKMENT TO THE LEFT OF THE DROP INLET. (5/5/81)

APPENDIX D

HYDROLOGIC AND HYDRAULIC ENGINEERING DATA

ARLINGTON LAKE DAM
APPENDIX D
HYDROLOGIC AND HYDRAULIC ENGINEERING DATA

TABLE OF CONTENTS

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1.70 MI.^{2}, BRUSHLAND & WOODLAND MILD TO MODERATE SLOPE, SOME URBAN DEVELOPMENT

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): EL. 474.8 MSL (14 AC-FT)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N/A

ELEVATION MAXIMUM DESIGN POOL: N/A

ELEVATION TOP DAM: LOW POINT EL. 477.8 MSL

SPILLWAY

a. Elevation PRINCIPAL SPWY. EL. 474.8 MSL, WASTEWAY EL. 476.7 MSL

b. Type UNGATED CONCRETE OVERFLOW SPILLWAY

c. Width PRINCIPAL SPILLWAY : 1 FT., WASTEWAY : 1 FT.

d. Length PRINCIPAL SPILLWAY : 8 FT., WASTEWAY : 30 FT.

e. Location Spillover AT LEFT DAM ABUTMENT

f. Number and Type of Gates NONE

OUTLET WORKS:

a. Type DROP INLET WITH 3 FT. WEIR LENGTH (EL. 476.3)

b. Location APPROXIMATE MIDPOINT OF DAM

c. Entrance inverts INVERT OF 12-IN. PIPE : EL. 471.9 MSL

d. Exit inverts INVERT OF 36-IN. PIPE : EL. 466.1 MSL

e. Emergency draindown facilities STOPLOG AT INLET TO 12-IN. PIPE

HYDROMETEOROLOGICAL GAGES: NONE

a. Type N/A

b. Location N/A

c. Records NONE

MAXIMUM NON-DAMAGING DISCHARGE: UNKNOWN

HEC-1, REVISED
FLOOD HYDROGRAPH PACKAGE

The original "Flood Hydrograph Package" (HEC-1), developed by the Hydrologic Engineering Center, Corps of Engineers, has been modified for use under the National Dam Inspection Program. The "Flood Hydrograph Package (HEC-1), Dam Safety Version", hereinafter referred to as, HEC-1, Rev., has been modified to require less detailed input and to include a dam breach analysis. The required input is obtained from the field inspection of a dam, any available design/evaluation data, relatively simple hydraulic calculations, or information from the USGS Quandrangle maps. The input format is flexible in order to reflect any unique characteristics of an individual dam.

HEC-1, Rev. computes a reservoir inflow hydrograph based on individual watershed characteristics such as: area, percentage of impervious surface area, watershed shape, and hydrograph characteristics determined from regional correlation studies by the Corps of Engineers, Baltimore District. The inflow is routed through the reservoir using spillway discharge data obtained from the field inspection or design data. Flood storage capacity is determined from USGS maps or design information and verified by the field inspection. In the event a spillway cannot discharge 0.5 PMF without overtopping and failure of the dam, downstream channel characteristics obtained from the field inspection and USGS maps are inputed and flows are routed downstream to the damage center and a dam breach analysis is performed 1/

Included in this Appendix are the HEC-1, Rev. pertinent input values and a summary print-out.

1/ "High" hazard structures only

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO
Arlington Lake Dam	3	E	4/10/81	1641-014-111

Hydrology Calculations

Drainage Area (Planimetered from USGS Quad Sh.) = 1.70 mi²

Surface Area

Elev.		Area (Acres)
465	(Estimated Bottom of Impoundment)	0
475	(Normal Pool)	4.6
480		47.0

PMP calcs. (HMR 33)

Area is in Zone 6

24 hr., 200 mi² rainfall = 22.2"

Hr.	%	Rainfall	Δ Rainfall
6	113	25.1"	25.1"
12	123	27.3"	2.2"
24	132	29.3"	2.0"
48	142	31.5"	2.2"

Snyder Coefficients (Information provided by Balt. COE)

Area is in Zone 1

$C_p = 0.45$, $C_t = 1.23$

$T_p = 1.23 (L \times L_{CA})^{0.3}$

$L \approx 1.82$ miles, $L_{CA} = 1.15$ miles

$T_p = 1.23 (1.82 \times 1.15)^{0.3}$

$T_p = 1.54$ hrs.

O'BRIEN & GERE

JECT	SHEET	BY	DATE	JOB NO
ARLINGTON LAKE DAM	4	JFR	6-22-81	1841-014-111

LE 7/2/81

HYDRAULICS CALCULATIONS

PRINCIPAL SPILLWAY

$$Q_s = C L H_s^{3/2}$$

$C = 3.0$
$L = 8$ FT.
H_s = HEIGHT OF RES. WATER SURFACE ABOVE SPILLWAY CREST EL. 474.8

WASTEWAY

$$Q_w = C L_w H_w^{3/2}$$

$C = 3.0$
$L_w = 30$ FT.
H_w = HEIGHT OF THE RES. WATER SURFACE ABOVE THE WASTEWAY CREST EL. 476.7 (LOW PT.)

DROP INLET & 36-IN. OUTLET CONDUIT

WEIR CONTROL: $Q_o = C L H_o^{3/2}$

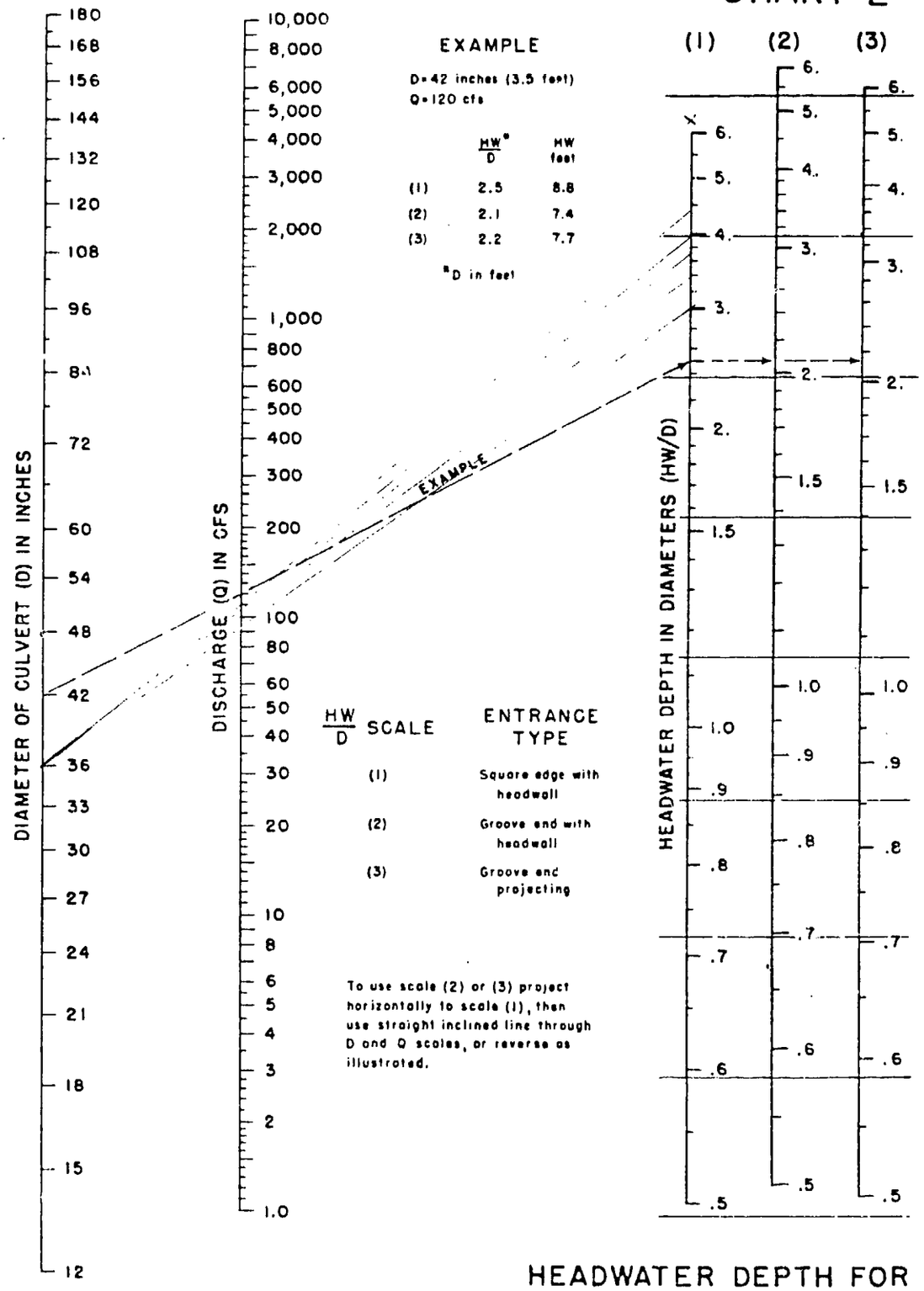
$C = 3.0$
$L = 3$ FT.
H_o = HEIGHT OF RES. SURFACE ABOVE CREST EL. 476.3

INLET CONTROL: SEE NOMOGRAPH ON FOLLOWING PAGE; BUREAU OF PUBLIC ROADS, JAN. 1963.

HW = HEIGHT OF RES. SURFACE ABOVE THE INVERT OF THE 36" DIA. CONCRETE OUTLET CONDUIT, EL. 471.5

SHEET 5

CHART 2



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 283
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN 1963

O'BRIEN & GERE

ECT: ARLINGTON LAKE DAM | SHEET: 6 | BY: CMR | DATE: 6-22-81 | JOB NO.: 1841-04-111

SPILLWAY RATING DATA

W.S.E.	H_S (FT)	Q_S (CFS)	H_W (FT)	Q_W (CFS)	H_O (FT)	HW (FT)	Q_O (CFS)	Q_T (CFS)
474.8	0	0						0
475.2	.4	6						6
475.6	.8	17						17
476.0	1.2	32						32
476.3	1.5	44			0	4.4	0	44
476.7	1.9	63	0	0	.4	4.8	2	65
477.1	2.3	84	.4	23	.8	5.2	6	113
477.5	2.7	106	.8	64	1.2	5.6	12	182
477.9	3.1	131	1.2	118	1.6	6.0	18	267
478.0	3.2	137	1.3	133				270
478.5	3.7	171	1.8	217				388
479.0	4.2	207	2.3	314				521
479.5	4.7	245	2.8	422				667
480.0	5.2	285	3.3	540				825
481.0	6.2	371	4.3	803				1174
482.0	7.2	464	5.3	1098				1562
483.0	8.2	564	6.3	1423				1987
484.0	9.2	670	7.3	1775				2445
485.0	10.2	782	8.3	2152				2934

After the dam overtops flow through the 36"Φ pipe will be negligible because the pipe will be submerged on each end.

VEF 7/2/81

DAM OVERTOPPING

$Q_D = CLH^{3/2}$; $C = 2.6$, $L(MAX) = 87'$ (EXCLUDING SPILLWAYS & PORTIONS OF CREST SUPPORTING HOUSES)

```
 1        A1                    NATIONAL DAM INSPECTION PROGRAM
 2        A2                       ARLINGTON LAKE DAM
 3        A3                        PMF HYDROGRAPH
 4        B    300      0     10      0      0      0      0      0     -4      0
 5        B1     5
 6        J      1      9      1
 7        J1   .05    .10    .15    .20    .25    .30    .35    .40    .50
 8        K      0   LAKE      0      0      0      0      1
 9        K1                     RUNOFF TO ARLINGTON LAKE
10        M      1      1    1.7
11        P      0   22.2    113    123    132    142                         1
12        T
13        W   1.54    .45                                 1.0    .05
14        X   -1.5   -.05      2
15        K      1    DAM      0      0      0      0      1
16        K1                     OUTFLOW FROM ARLINGTON LAKE DAM
17        Y                              1      1
18        Y1     1                                     -474.8     -1
19        Y4 474.8  475.2  475.5  476.0  476.3  476.7  477.1  477.5  477.9  478.0
20        Y4 478.5  479.0  479.5  480.0  481.0  482.0  483.0  484.0  485.0
21        Y5     0      6     17     32     44     65    113    182    267    270
22        Y5   368    521    687    825   1174   1582   1987   2445   2734
23        $A     0    4.6     47    230
24        $E   465    475    480    500
25        $$ 474.3
26        $D 477.8    2.6    1.5     95
27        $L     0     11     11     80     95
28        $D 477.8  477.9  478.0  478.1  479.8
29        K     99
1
                PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                    RUNOFF HYDROGRAPH AT          LAKE
                    ROUTE HYDROGRAPH TO           DAM
                    END OF NETWORK
```

```
                         NATIONAL DAM INSPECTION PROGRAM
                             ARLINGTON LAKE DAM
                               PMF HYDROGRAPH

                              JOB SPECIFICATION
       NQ     NHR    NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
      300       0      10       0       0       0       0       0      -4       0
                               JOPER    NWT   LROPT   TRACE
                                   5      0       0       0

                       MULTI-PLAN ANALYSES TO BE PERFORMED
                         NPLAN= 1 NRTIO= 9 LRTIO= 1
     RTIOS=   .05    .10    .15    .20    .25    .30    .35    .40    .50
```

Sh 7

SUB-AREA RUNOFF COMPUTATION

RUNOFF TO ARLINGTON LAKE

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	LAKE	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

	IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
	1	1	1.70	0.00	1.70	0.00	0.000	0	1	0

PRECIP DATA

	STPE	PMS	R6	R12	R24	R48	R72	R96
	0.00	22.20	113.00	123.00	132.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .300

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 1.34 CP= .45 NTA= 0

RECESSION DATA

STRTQ= 1.50 QRCSN= .05 RTIOR= 1.00

UNIT HYDROGRAPH 33 END-OF-PERIOD ORDINATES, LAG= 1.35 HOURS, CP= .45 VOL= 1.00

10.	38.	77.	124.	173.	227.	270.	303.	323.	328.
312.	291.	272.	254.	237.	222.	207.	193.	180.	168.
157.	147.	137.	128.	119.	112.	104.	97.	91.	85.
79.	74.	69.	64.	60.	56.	52.	49.	46.	43.
40.	37.	35.	32.	30.	28.	26.	25.	23.	21.
20.	19.	17.	16.	15.	14.	13.	12.	12.	11.
10.	9.	9.	8.	8.	7.	7.	6.	6.	5.
5.	5.	4.	4.	4.	4.	3.	3.	3.	3.
3.	2.	2.							

0

END-OF-PERIOD FLOW

NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	25.22	22.82	2.40	146688.
										(341.)(580.)(61.)(4153.74)			

********** *********** ********** ********* **********

HYDROGRAPH ROUTING

OUTFLOW FROM ARLINGTON LAKE DAM

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	DAM	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSAK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	1.000	-425.	-1

Sh 8

STAGE	474.80	475.20	475.60	476.00	476.30	476.70	477.10	477.50	477.90	478.00
	478.50	479.00	479.50	480.00	481.00	482.00	483.00	484.00	485.00	
FLOW	0.00	6.00	17.00	32.00	44.00	85.00	113.00	182.00	267.00	270.00
	388.00	521.00	667.00	825.00	1174.00	1562.00	1987.00	2445.00	2934.00	
SURFACE AREA=	0.	5.	47.	230.						
CAPACITY=	0.	15.	126.	2838.						
ELEVATION=	465.	475.	480.	500.						

CRCL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
474.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
477.8	2.8	1.5	95.

CREST LENGTH	0.	11.	11.	80.	95.
AT OR BELOW ELEVATION	477.8	477.9	478.0	478.1	479.8

PEAK OUTFLOW IS 150. AT TIME 42.83 HOURS

PEAK OUTFLOW IS 337. AT TIME 42.67 HOURS

PEAK OUTFLOW IS 540. AT TIME 42.17 HOURS

PEAK OUTFLOW IS 733. AT TIME 42.00 HOURS

PEAK OUTFLOW IS 926. AT TIME 42.00 HOURS

PEAK OUTFLOW IS 1113. AT TIME 42.00 HOURS

PEAK OUTFLOW IS 1301. AT TIME 42.00 HOURS

PEAK OUTFLOW IS 1488. AT TIME 42.00 HOURS

PEAK OUTFLOW IS 1681. AT TIME 42.00 HOURS

Sh 9

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS								
				RATIO 1 .05	RATIO 2 .10	RATIO 3 .15	RATIO 4 .20	RATIO 5 .25	RATIO 6 .30	RATIO 7 .35	RATIO 8 .40	RATIO 9 .50
HYDROGRAPH AT	LAKE	1.70	1	200.	401.	601.	802.	1002.	1203.	1403.	1603.	2004.
		(4.40)	(	5.68)(	11.35)(	17.03)(	22.70)(	28.38)(	34.05)(	39.73)(	45.41)(	56.76)
ROUTED TO	DAM	1.70	1	160.	337.	540.	733.	925.	1113.	1301.	1488.	1864.
		(4.40)	(	4.53)(	9.53)(	15.28)(	20.77)(	26.20)(	31.53)(	36.85)(	42.13)(	52.78)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	474.80	474.80	477.80
STORAGE	14.	14.	51.
OUTFLOW	0.	0.	246.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.05	477.37	0.00	42.	160.	0.00	42.83	0.00
.10	478.20	.40	60.	337.	3.83	42.67	0.00
.15	478.63	.83	73.	540.	5.67	42.17	0.00
.20	478.95	1.15	83.	733.	7.17	42.00	0.00
.25	479.22	1.42	93.	925.	8.33	42.00	0.00
.30	479.47	1.67	103.	1113.	9.17	42.00	0.00
.35	479.70	1.90	112.	1301.	10.00	42.00	0.00
.40	479.92	2.12	122.	1488.	10.50	42.00	0.00
.50	480.31	2.51	141.	1864.	11.50	42.00	0.00

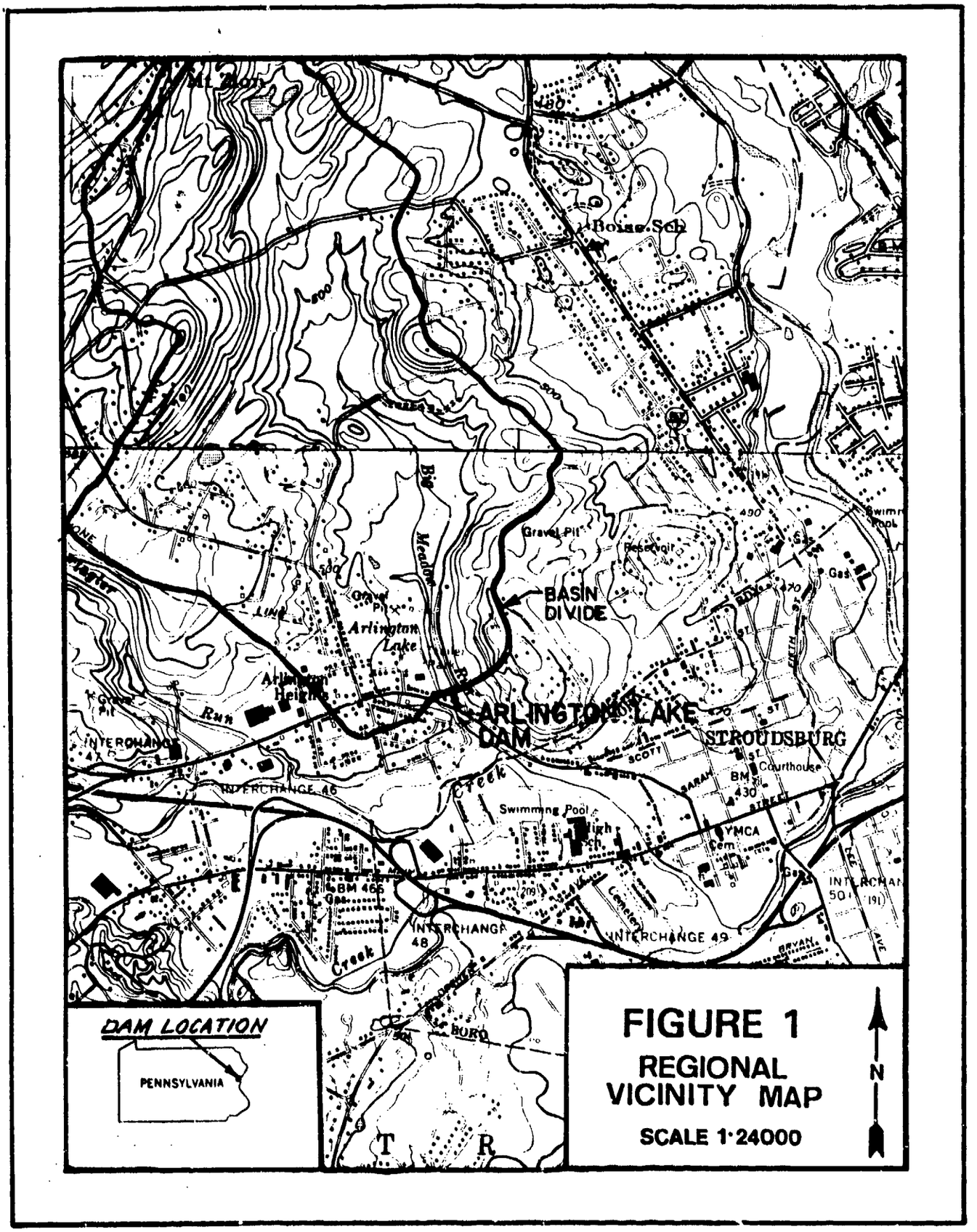
Sh 10

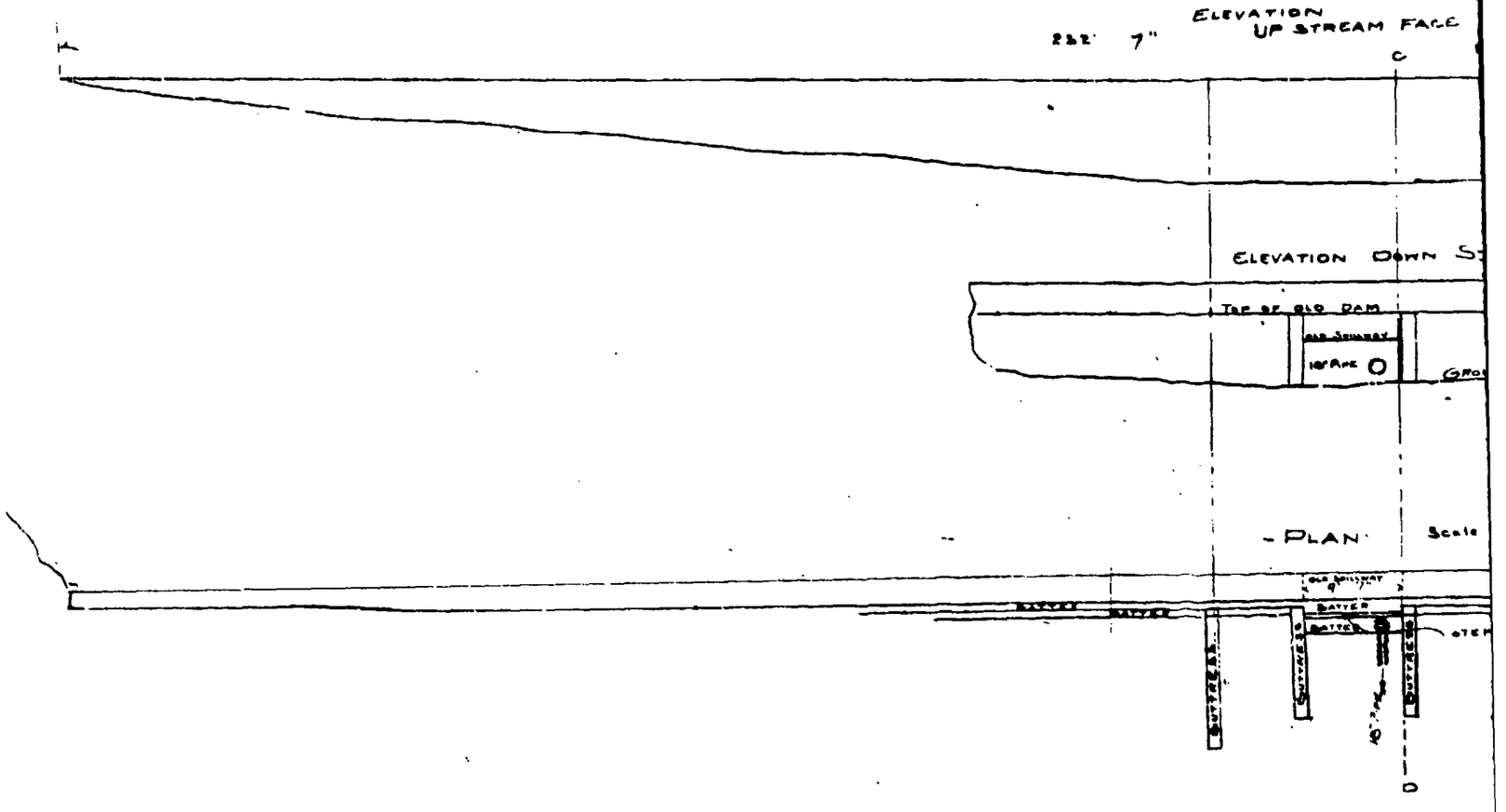
APPENDIX E

REGIONAL VICINITY MAP
&
DRAWINGS

ARLINGTON LAKE DAM
APPENDIX E
DRAWINGS

TABLE OF CONTENTS

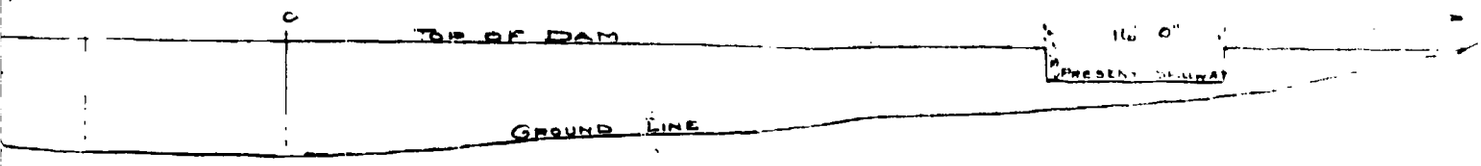

Mt Zion
Boise Sch
Big Meadow Run
Gravel Pit
Reservoir
BASIN DIVIDE
Arlington Lake
Arlington Heights
ARLINGTON LAKE DAM
STROUDSBURG
Courthouse
YMCA
Swimming Pool
INTERCHANGE 46
INTERCHANGE 48
INTERCHANGE 49
Creek
Cemetery
DAM LOCATION
PENNSYLVANIA
T
R
FIGURE 1
REGIONAL VICINITY MAP
SCALE 1·24000
N



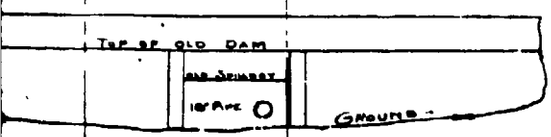
PLAN ELEVATIONS & SECTION
OF
ALBERTS DAM
ON
BIG MEADOW CREEK
STROUD TOWNSHIP MONROE CO PA.
1913

PLAN DRAWN FROM THE DAM
AFTER ITS COMPLETION
BY
William Penn Shambaugh R

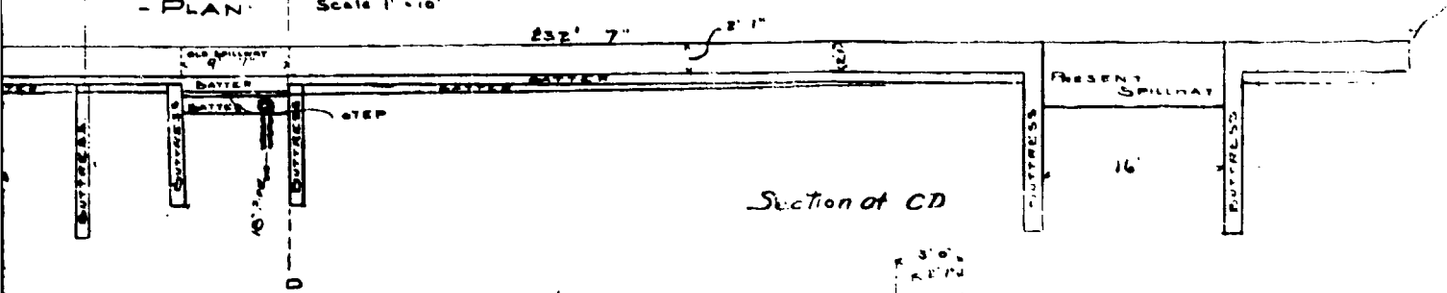
ELEVATION
UP STREAM FACE Scale 1" = 10'



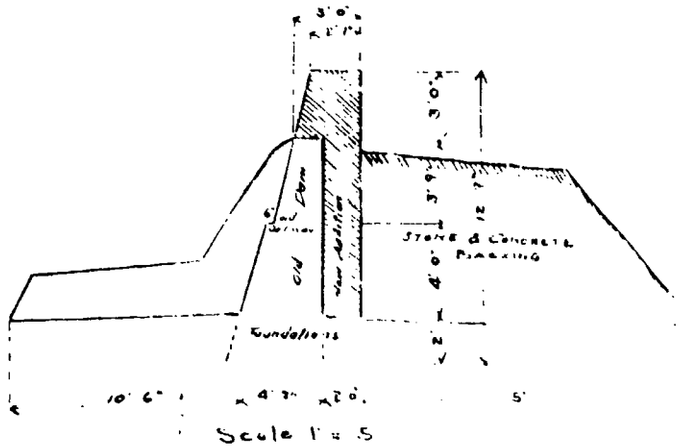
ELEVATION DOWN STREAM AT OLD SPILLWAY



- PLAN Scale 1" = 10'



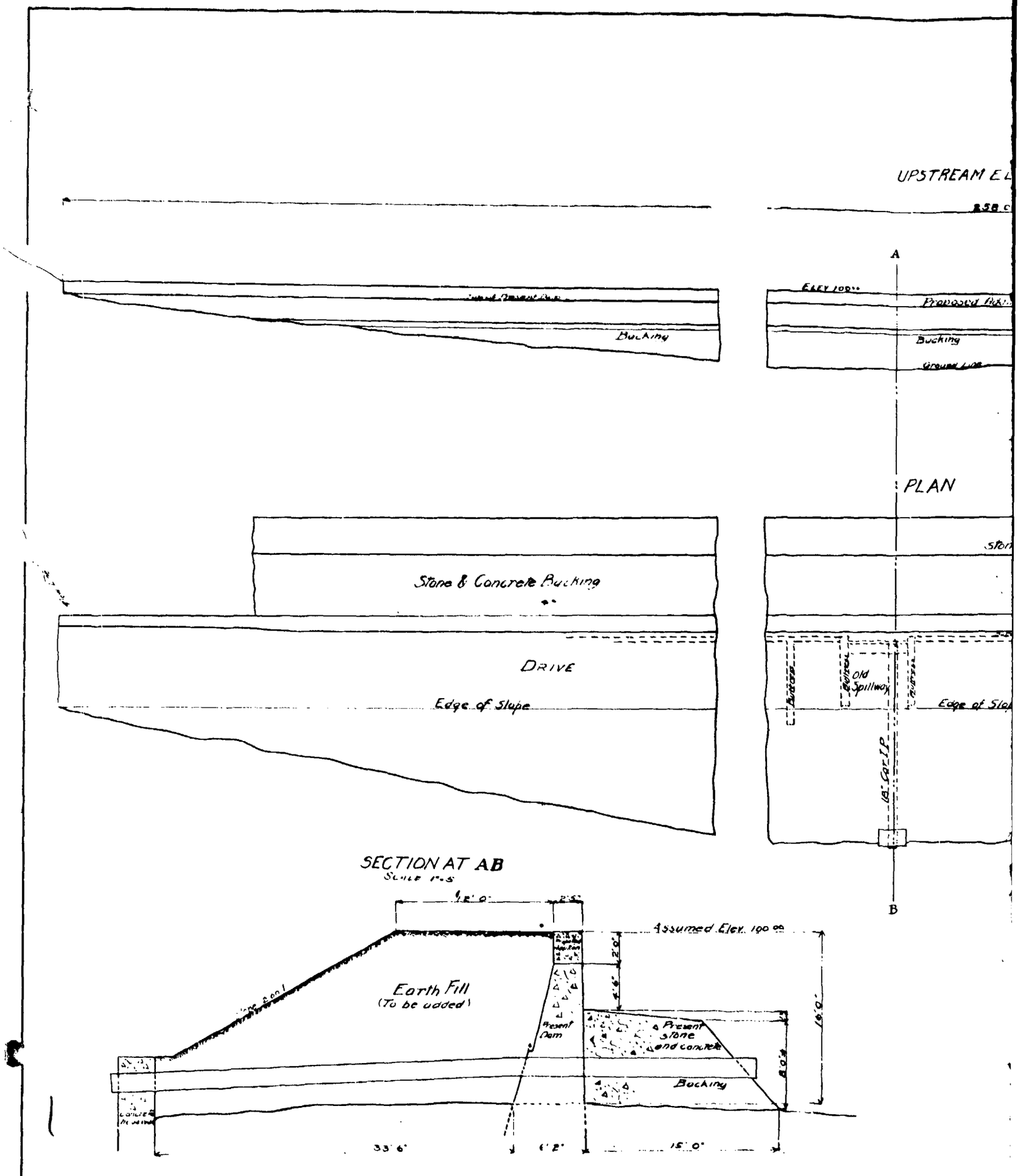
Section at CD



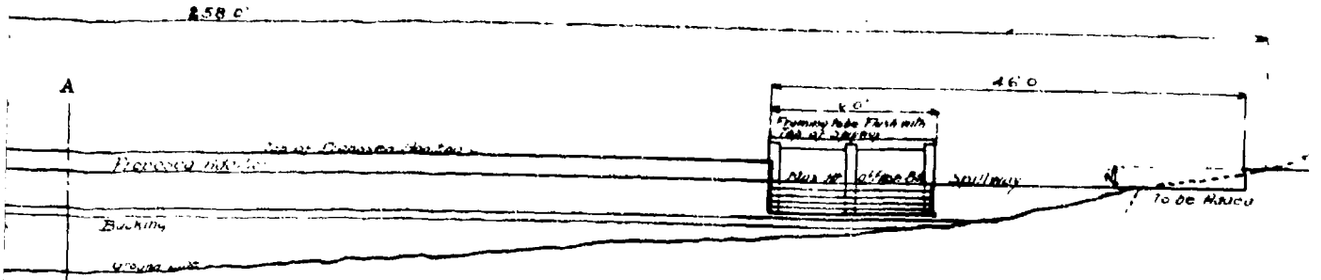
Scale 1" = 5

2

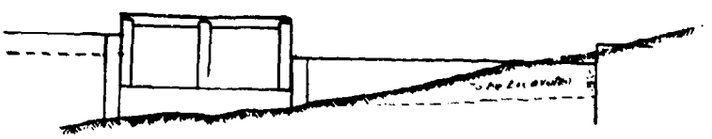
SHEET 2


UPSTREAM EL
A
Bucking
Bucking
PLAN
Stone & Concrete Bucking
DRIVE
Edge of Slope
Old Spillway
Edge of Slop
B
SECTION AT AB
Assumed Elev. 100 00
Earth Fill
(To be added)
Present Dam
Present stone and concrete
Bucking
33' 6"
6' 2"
15' 0"

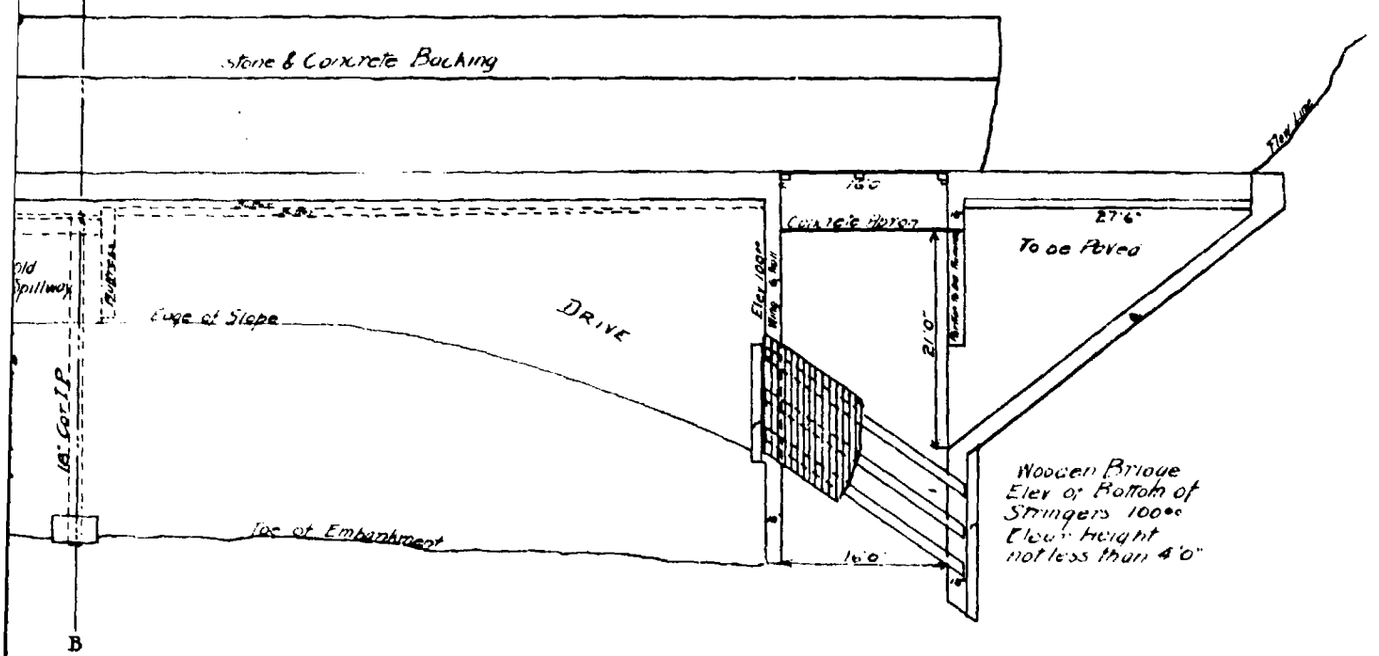
UPSTREAM ELEVATION



DOWNSTREAM ELEVATION



PLAN



PLAN OF PROPOSED CHANGES
IN
ALBERT'S DAM
ON THE
BIG MEADOW CREEK
STROUD TP. MONROE CO. PA.

SCALE 1"=10'

JAN. 31 1914

SHEET 3

APPENDIX F

GEOLOGY

SITE GEOLOGY

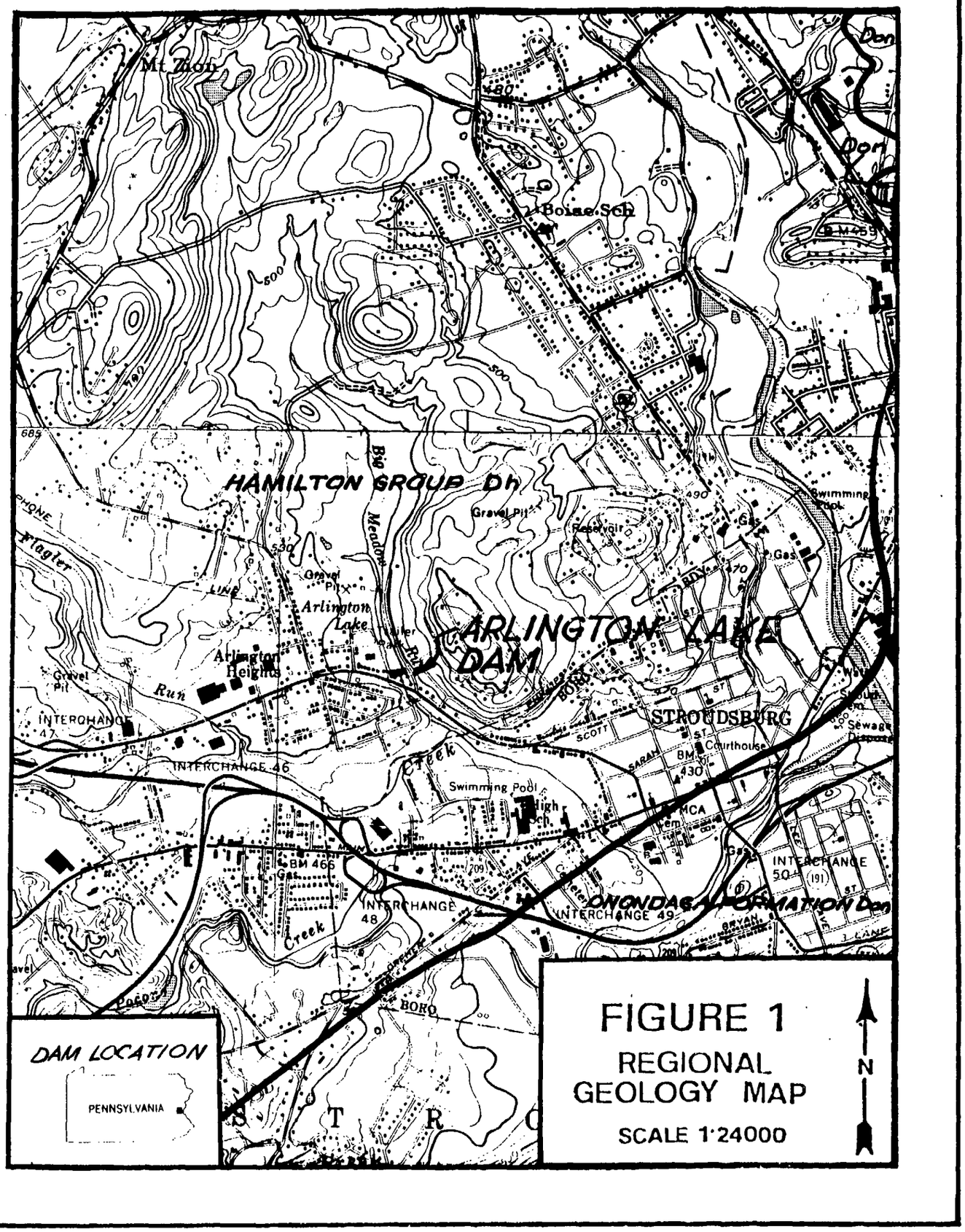
ARLINGTON LAKE DAM

Arlington Lake Dam is located in Monroe County, Pa., within the Pocono Plateau section of the Appalachian Plateau physiographic province, and underlain by Devonian marine sedimentary units of the Mahantango and probably the Marcellus formations. Overyling the bedrock in valleys and side slopes are drift deposits of both Wisconsin and earlier Illinois glacial epochs. Thickness of this overburden varies considerably as does the character of the deposits which range from clay and fine sand to boulder sizes. Dip of the bedrock units is about 25° NW and strike is approximately NE-SW.

Rock types in the Mahantango and Marcellus units ranges from gray fossiliferous shale and sandstone, to black, fissile, carbonaceous and calcareous shale. Jointing is well developed in both formations.

No major structural weaknesses are known to occur in the vicinity of the dam.

Permeability and porosity of the glacial deposits ranges from high in the sand and gravel zones to low or poor in clayey portions.


Mt Zion
Boise Sch
HAMILTON GROUP Dh
Big Meadow Run
Gravel Pit
Reservoir
Swimming Pool
Arlington Lake
ARLINGTON LAKE DAM
Arlington Heights
Gravel Pit
INTERCHANGE 47
INTERCHANGE 46
STROUDSBURG
Courthouse
Swimming Pool
High Sch.
MCA
BM 466
INTERCHANGE 48
INTERCHANGE 49
INTERCHANGE 50
ONONDAGA FORMATION
Creek
BORO
DAM LOCATION
PENNSYLVANIA
S T R C
FIGURE 1
REGIONAL GEOLOGY MAP
SCALE 1:24000
N